HW 7 Due: 6 March 2025

As always, your answer will be graded on the quality of presentation as well as the correct answer. To get a good score: write your answer neatly, use complete sentences, and *justify your work.*

1. Suppose $(a_n)_{n\in\mathbb{N}}$ is a sequence with $a_0 = 5$, and for any $n \in \mathbb{N}$,

   $$a_{n+1} = a_n + n(n-2).$$

   Find a closed formula for $(a_n)_{n\in\mathbb{N}}$.

2. Suppose $(b_n)_{n\in\mathbb{N}}$ is a sequence with $b_4 = 17$, and for any $n \in \mathbb{N}$,

   $$b_{n+1} = b_n + (n+1)^2.$$

   Find a closed formula for $(b_n)_{n\in\mathbb{N}}$.

3. Suppose $(c_n)_{n\in\mathbb{N}}$ is a sequence with $b_0 = 5$, $b_1 = 28$, and for any $n \in \mathbb{N}$,

   $$c_{n+2} = 11c_{n+1} - 30c_n.$$

   Find a closed formula for $(c_n)_{n\in\mathbb{N}}$.

4. Consider the sequence $(d_n)_{n\in\mathbb{N}}$ defined by $d_n = 3\left(1+\sqrt{5}\right)^n + 3\left(1-\sqrt{5}\right)^n$. Find integers A, B such that for all $n \in \mathbb{N}$,

   $$d_{n+2} = Ad_{n+1} + Bd_n.$$